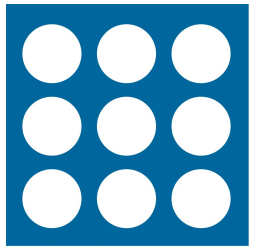


ENUM:
A heretic's view on SIP Routing

RIPE55

2007/10/25

Otmar Lendl <otmar.lendl@enum.at>

Overview

enum.at
net.communications

- Geoff recap
- Surveying the problem space
- Implications for a SIP routing architecture

Geoff's Contrarian View

enum.at
net.communications

- User-ENUM: little traction
- Infrastructure-ENUM:
  - Find interconnection points (full control, security, …)
  - Telco complexity

    versus
  - IETF processes are slow
  - "D" flag / URI record
- Private ENUM trees for bilateral interconnection
- (missing: internal ENUM)
- Speermint?

Setting

enum.at
net.communications

- Imagine the PSTN goes away.
  - Hey, we're in Amsterdam. Dreaming is legal.
  - Pooof! Your default route is gone.
- Carrier Interconnection moves to VoIP.
- Call Routing leaves the stone-age of SS7-style routing and uses Internet-age protocols.

- What do we need?

Phone Numbers

enum.at
net.communications

- Telephone numbers are here to stay.
  - Metcalfe's law for more than a billion endpoints.
  - Works in (nearly) all cultures.
  - Any contender must be compatible to TN.
  - Closed groups may use other schemes internally, but the lingua franca will continue to be the TN.

Inter-carrier Compensation

enum.at
net.communications

- Two stable states:
  - Sender-keeps-all
  - Mutual settlement
- A multi-billion Euro industry depends on termination fees.
- Premium rate services are huge.

Can this flip?

enum.at
net.communications

- Bi-lateral settlement-free peerings?
  - Open to arbitrage
    - Carriers might sometimes be stupid, but they really know arbitrage.
  - Legal minefield for incumbents

- How can this change?
  - Through massive arbitrage by end-users/corporations
  - Regulatory intervention
  - I don’t hold my breath.

Full Mesh?

enum.at
net.communications

- If there is settlement between carriers:
  - There needs to be a contract
  - Manual configuration of peerings
- Impossible to have a full peering mesh between all carriers.
- Peering fabrics / hubs only help so much.
- Even if settlement is abolished: Do we dare to replicate the email model for the phone system?

RFC 3263

enum.at
net.communications

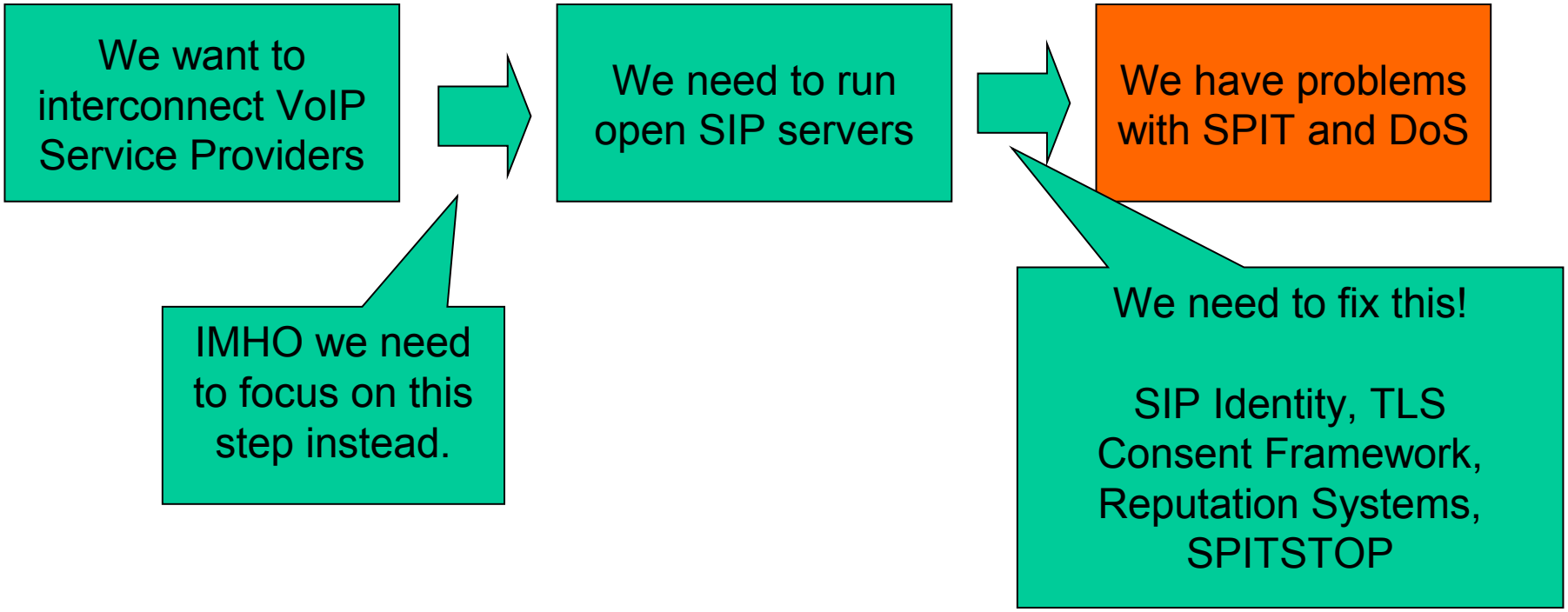
- “Locating SIP servers”
  - NAPTR / SRV / A lookups
  - Just like MX / A for email

- Assumes the email model.
- Independent of who is asking.
- It’s a mapping, not a routing protocol.

- That is not what we need, but what the IETF pushes.

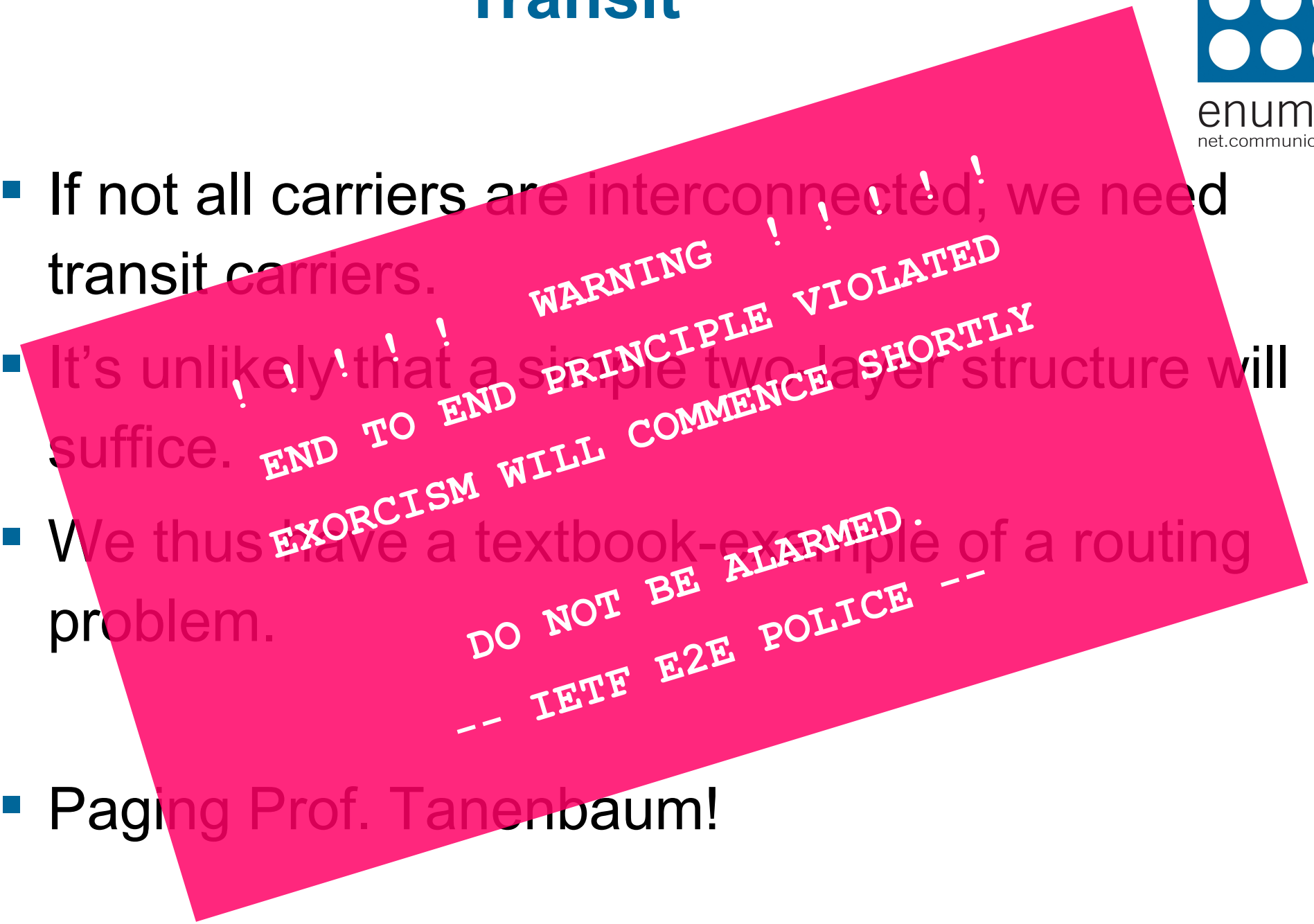
What the IETF thinks

enum.at
net.communications



Transit

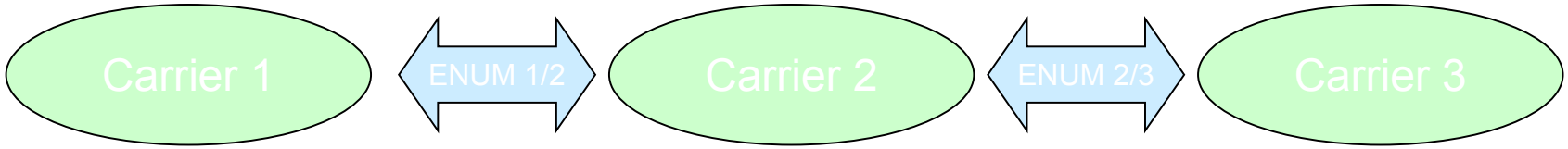
- If not all carriers are interconnected, we need transit carriers.
- It's unlikely that a simple two layer structure will suffice.
- We thus have a textbook-example of a routing problem.
- Paging Prof. Tanenbaum!



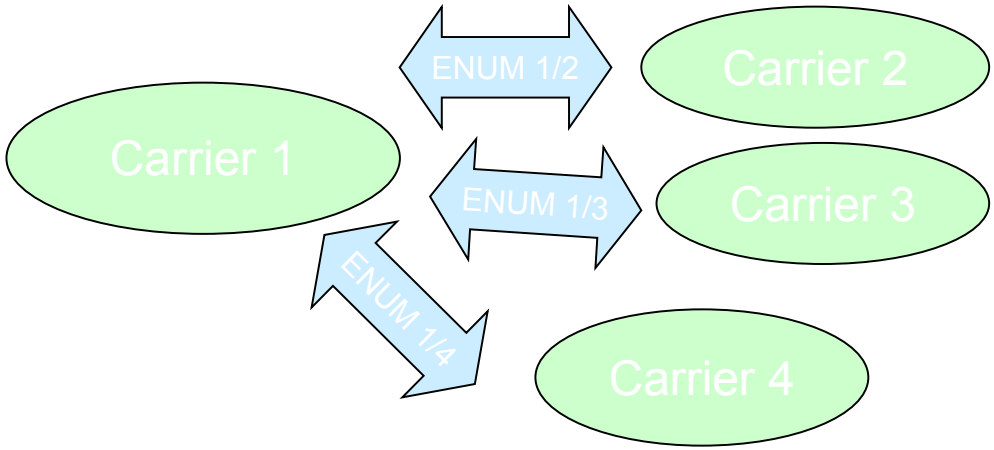
Can private ENUM help?

enum.at
net.communications

- ENUM is a lookup, not a routing protocol:



- Parallel queries?



What about DNS Views?

enum.at
net.communications

- Idea: Why not use split-DNS to announce to potential peering partners exactly what they need to see?
- See e.g. Arbinet

- In order to play tricks with the DNS, you need to know who's asking. We can't assume that all carriers know each other.

Route based on what?

enum.at
net.communications

- Telephone numbers?
  - Aggregation properties get worse every day.
  - Routing table size is huge.
  - Has been tried: TRIP (RFC3219)
- Domain names?
  - # Domains?
  - Aggregation?
- Something else?

Now what?

enum.at
net.communications

- Geoff talked about identities on tuesday in the context of IP / TCP / mobile IP.

- I think we have the same issue here: We need another layer of identifiers.
  - This time it isn't for the transport layer, but for the SIP routing layer

SIP Routing Identifier

enum.at
net.communications

- Granularity:
  - Small VoIP Operator
  - “All KPN mobile customers”
  - “European Verizon customers”
  - Basically: similar level as AS numbers
- Protocol needs:
  - A mapping from E.164 number to this RI.
  - A mapping from SIP AoR to this RI.
  - A routing protocol which gives next-hop information keyed on the RI.

Thus public I-ENUM

enum.at
net.communications

- Requirements:
  - Not country-specific
  - Read-access for all “carriers”
  - Entrance barrier is very low for SIP operators
- Thus:
  - All operators in all countries need access
  - Weakest link in the chain type security
  - Why bother?
- Don’t make the information secret, restrict its usefulness.

So …

enum.at
net.communications

- The IETF needs to accept that the end-to-end model has failed for SIP.
  - … and reflect that in the speermint charter.
  - Or charter a WG which targets the big picture of SIP routing.

- The carriers need to accept that there are a lot of small players in the game, and that national solutions are inadequate.

… what about:

enum.at
net.communications

- Three (logical) steps:
  - Lookup step (public I-ENUM)
    - Map number to who owns the number
  - Policy step (some BGP-like Routing protocol)
    - Can I directly peer?
    - Do I need to go via transit SP?
    - Not reachable?
  - Location function (can be specific to peering)
    - How do I determine the IP-address/port/TLS-setting of my next hop?

That's it.

enum.at
net.communications

- Have a look at:
  - `draft-lendl-speermint-background`
  - `draft-lendl-domain-policy-ddds`
  - `draft-lendl-speermint-federations`
  - `draft-lendl-speermint-technical-policy`